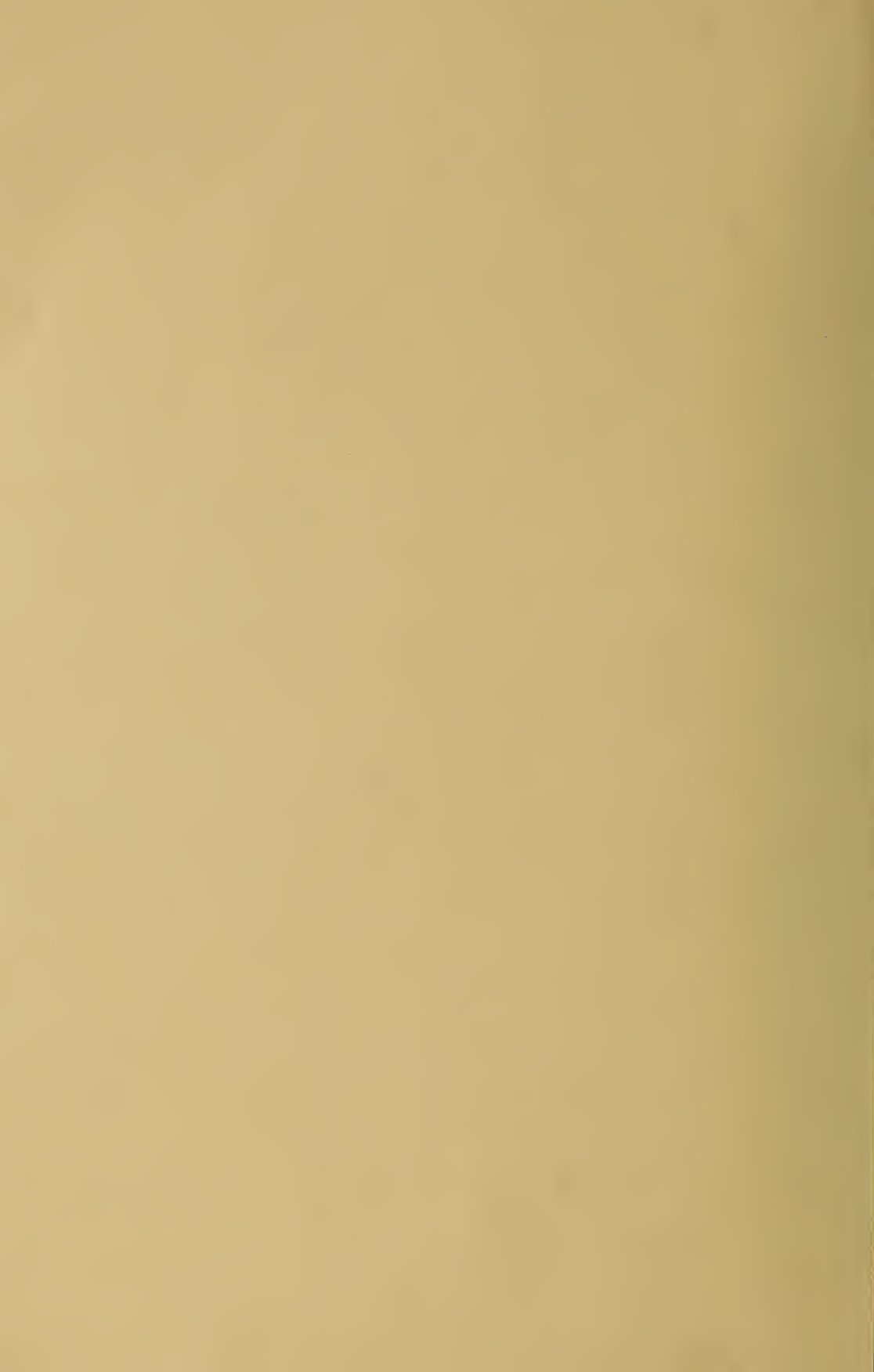


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Centralized Public Utility Management

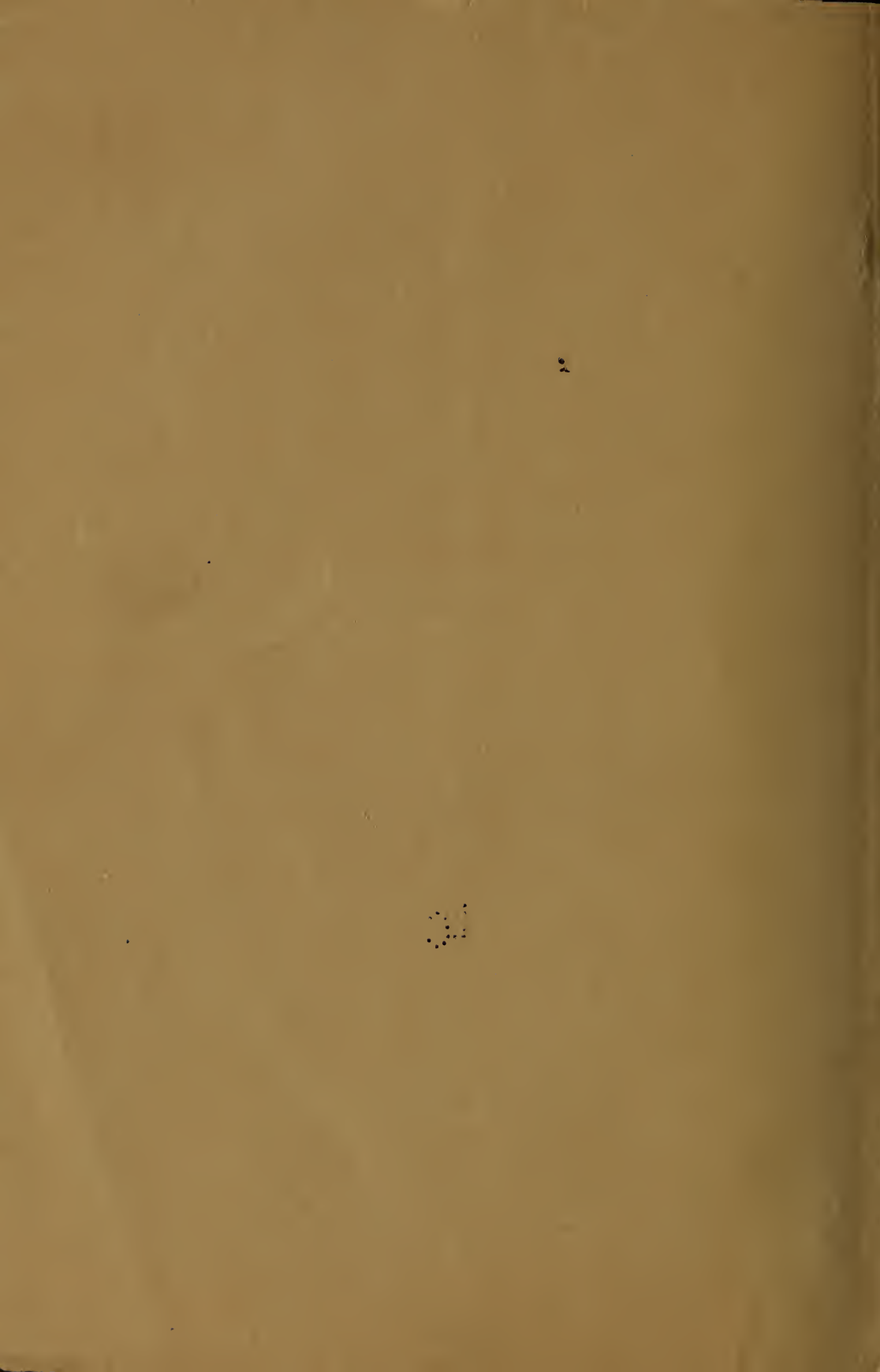
Development of Stone & Webster's Manage-
ment Organization in the past Thirty Years

MR. HENRY G. BRADLEE

In a Talk to the Convention of Managers and
Executives of the Management Division
of Stone & Webster, Inc., held
in Boston, October 10-18,

1921

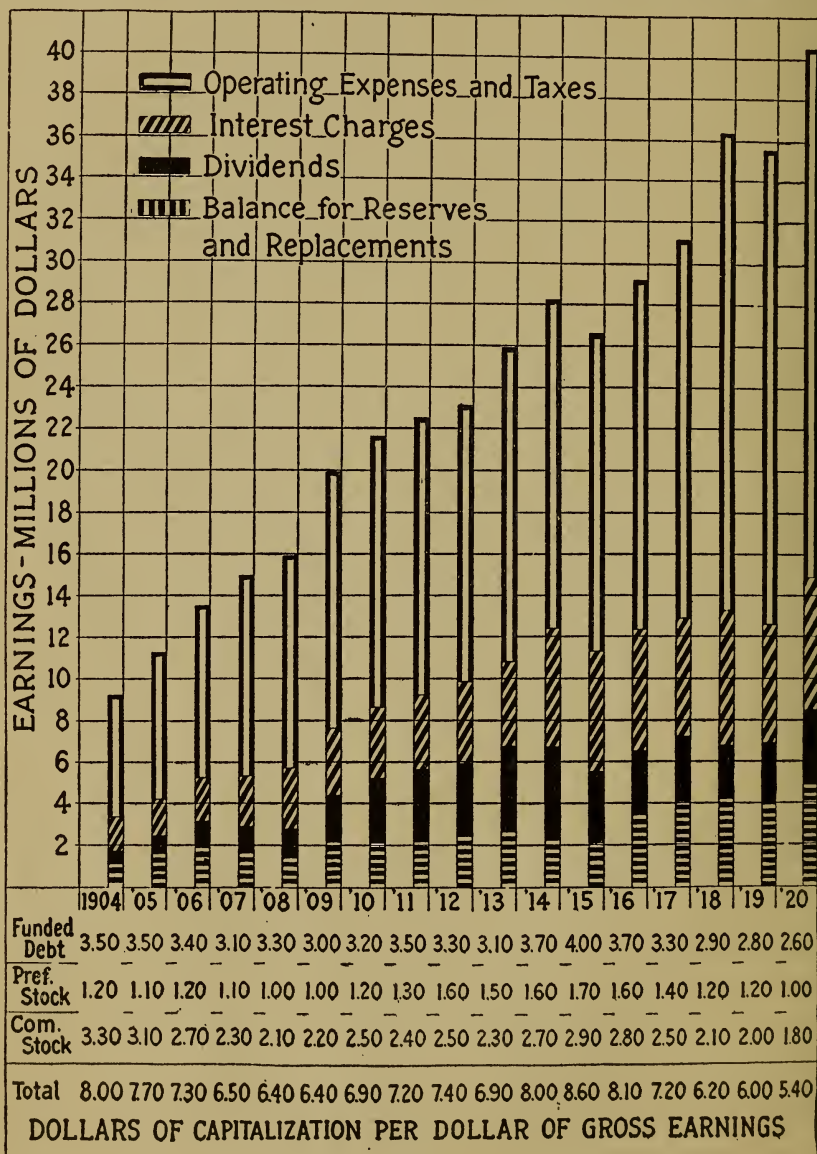
STONE & WEBSTER, Inc.



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Stone & Webster were pioneers in the management of separate public utilities through a central organization. During the last thirty years they have built up gradually a system of management which assures proper and uniform accounting, good engineering, economical financing, the benefit of purchasing in large quantities, proper records of the Acts of Corporations, the gathering and dissemination of information, the compilation and study of statistics of operation, the availability of trained men for the study and handling of special problems, and the broad view and consistent policy impossible to isolated properties but indispensable to the most successful operation.

FINANCIAL SHOWING OF PUBLIC UTILITIES UNDER STONE & WEBSTER MANAGEMENT



THIS PAMPHLET IS ISSUED FOR THE
INFORMATION OF ALL MEMBERS OF
THE STONE & WEBSTER ORGANIZATION
AND FOR ANY OTHERS INTERESTED IN
THE MANAGEMENT SERVICE FURNISHED
BY THE ORGANIZATION.

By Transfer
SEP 24 1923

CENTRALIZED PUBLIC UTILITY MANAGEMENT

A talk by MR. HENRY G. BRADLEE

(Mr. Henry G. Bradlee, of the firm of Stone & Webster, in a talk to a convention of managers and executives of the Stone & Webster management organization in October, 1921, stated the aims, development and accomplishments of this management. His remarks are published in this pamphlet form on account of the general interest in the subject, — a large majority of the public utilities of the country being now operated under centralized management.)

MR. CHAIRMAN AND FRIENDS:

It is a real pleasure to be here and see you all, even though it does involve getting on my feet and attempting to give you a talk which will not be too uninteresting. I was supposed to speak to you yesterday morning, but my senior partners were so long winded that they crowded me completely off the stage. It reminds me a little of a story I heard last week at the Street Railway Convention.

It seems that a gentleman was invited to address a gathering and was told that he had twenty minutes to talk; so he talked for twenty minutes, and then, as he was much interested in his subject, he kept on talking. His audience, evidently not as much interested as he, began to go out, one at a time, then two and three at a time, until the gathering began to get a little thin; and after he had talked a second twenty minutes, he still was not through, so he kept on and talked a third twenty minutes. But his audience grew thinner and thinner, until at last there was only one man left. He turned to the one man and said, "My dear sir, I am very much pleased to see that there is one man sufficiently interested in my speech to stay through it." The fellow looked up at him and said, "You darn fool, I wasn't interested in what you said. I'm the next speaker!" *(Laughter and applause.)*

I am better off than that fellow, because, though you all left, I now have you back again.

I was asked to tell you about the management contract, — what it is, why it is, and what has been done under it, — and when I tried to figure out what I should say, I found I could speak for many hours without exhausting the subject; so I will try to give you only a rough picture of some of the reasons which lead up to the contract and some of the reasons for its present form.

In the first place, Mr. Hunt has just said that there seems to be more or less ignorance with regard to this contract. The statement was made to me a few days ago that in addition to ignorance there was in a few cases the thought that there was something secret or mysterious about it. There was a vague feeling that it was not a subject on which one should ask questions. If any such idea exists it is wholly wrong. There is nothing secret, nothing mysterious about the contract; on the contrary,

it is open to everybody, not only in the Organization but outside the Organization, everybody in the United States who is interested in knowing about it. The only thing that we do want you to have in mind is that when you take this contract out and show it to people in your local community, you should explain to them what it means. It is necessarily pretty complicated. We do a great many things for the companies under our management, and in order to express these in the contract, we have to cover a great deal of ground. There is possibility of misunderstandings, and the contract should be explained as far as you may so that every one will understand it. The more people understand what we are doing and what that contract is, the better for all concerned.

I want to go back to that tree that Mr. Stone and Mr. Webster sat under when they agreed to go into business together. They decided at that time to go into the business of engineering. They had in mind in a vague way that they might do something in connection with public utility work, but for the first three years the business was confined entirely to construction and engineering. The thought of management came later.

In the early nineties the public utility business was in a pretty bad way. The investor was very much discouraged. The net earnings were very small and the situation was almost desperate. That gave Stone & Webster their opportunity. They were invited by investors here in Boston to look over certain properties and try to see if they could not find out what was the trouble with them and what should be done to improve the properties and get them on their feet. So Mr. Stone packed his bag and Mr. Webster packed his bag, and they started off. Before they were through, they had looked over something like seventy-five or one hundred properties, — at any rate, enough so that they had a pretty good picture of the industry as a whole. They found out a number of things. In the first place, those were the early days of the business. Properties were pretty poorly designed; the apparatus, generators, cars, and other parts of the properties were as good as could be obtained at that time, but they were poorly put together. The system as a whole was not properly designed for good public service. It was not designed for economy. Practically none of the ideas which we have now had been developed at all. There was no thought of the growth which was to take place in the future, no thought that there must be a strong financial structure to take care of it. The methods of finance were most unfavorable for raising money on a satisfactory basis, and the operation of the properties was decidedly uneconomical. Now those properties were all small. Even in the larger cities the individual companies were small because of competition. Before we became interested in the Seattle properties there were in Seattle, I think, eleven street railways and three electric light and power companies. When these were all combined the gross earnings amounted to only about \$700,000. It was pretty clear that the one great difficulty of these companies was that they could not get the kind of men they needed, the brains and experience which they had to have in order to build themselves up. The gross earnings were not such that they could afford to have even the proper executives, much less to maintain on their forces skilled men who were familiar with detailed operations, construction and finance. The one great problem to be solved was to find men fitted for their positions whom the company could afford to employ. Mr. Stone and Mr. Webster came to the conclusion that this

could be done only by some form of organized management, which would mean a bunch of those companies getting together, not necessarily financially, in order to get the help that they needed through cooperation and the sharing of expense. By doing that, they would be able to get, at a reasonable cost, the service, advice and assistance which was necessary, and without which they could not get out of the hole they were in. Having this idea in mind they started the management organization. They took over the management of a few companies, later increasing the number, and working out their organization as they went along. That the idea was correct, that it was successful, very few today would dispute. It has been developed throughout the industry, through holding companies and management associations such as ours, so that at least 75 per cent of the public utility industry in the United States is now under some form of centralized management. The system is being used in England, Germany, France, Italy, Holland, and other countries, and in these countries the methods used have developed along the same general lines as in our own. The main difference between ourselves and many others is that we have no holding company. Each of our companies has its own financial structure and operates apart from the others, except as they cooperate to secure the advantages in construction, operation and finance of the central organization.

Mr. Stone and Mr. Webster had at the start no clear idea as to just what form the organization should take, so they left it to time to develop that organization and felt their way as they went along. As a result the Organization has shifted very materially from its early start. The executive end of the Organization has changed, the departments in the Boston office have changed. Some that were started were found to be undesirable, and as time went on, these were weeded out. Others were found to have over-developed; in the enthusiasm of the early start they perhaps attempted to do too much, and they were cut down. Others that seemed relatively unimportant at the beginning have grown to be important branches of our work.

I will not attempt to go over all the details of the contract, but will touch on some of the clauses briefly and try to point out just a few of the important provisions.

A Co-Operative Scheme from Start to Finish

In the first place, the contract starts off as a proposition to the utility company, and agrees to supervise, under the direction and control of the Company's Board of Directors, the management, development, and financing of the Company's property and the property of any subsidiary companies which it may control. It agrees to put at the service of the company the entire Stone & Webster organization from Mr. Stone down to the office boy whenever and wherever any one of us can be helpful. The thought is that we should all be drawn in, that it should be our duty to help in any way that we can and that it should be our further duty to know what the Organization does in each department of its work; to know what information, experience, and talent are available; and to be sure that these are brought to bear on each important problem as it arises. You men in the field ought to know exactly what is available to you in experience, advice and assistance, and when you have a problem to solve you ought to know how to take it up, so that you may secure the greatest help from the Organization, and you should be sure to call for and obtain

this help. In other words, it is a cooperative scheme from start to finish, each one trying to help the other.

The contract then says that in general, the organization "proposes, under the direction and control of your Directors, to carry on as far as practicable the management work ordinarily done by the executives of a company, including President, Vice-Presidents, Secretary, and Treasurer, and to that end we will designate, as far as you desire, members of our management organization to serve as such executives without compensation." In most of the companies, members of the Organization fill those positions, and in general, it is our duty to carry out the work which would ordinarily go with those positions, and yet it is not the idea that those individual men are alone going to perform these duties. The idea is that the Organization, in so far as it properly may, is going to do broadly the things which those officers would do, and it is going to do them better than those officers could.

Two Heads are Better Than One

The contract next goes on to say that the executive charge of the company shall be in the hands of three men: one a Local Manager, one a District Manager, and one a Division Manager. There is no particular reason for having three men rather than two or four, except that we have found that it works best in practice. The idea of more than one man is simply that two heads are better than one, and that all problems in their initial stage, when considering what it is wise to do or when planning out a course of action, can be decided better when two or more men sit down and confer and give their mutual thought to the problem than when any one man takes it up, no matter how able that one man may be. The mere fact that there is a conference brings out many thoughts and many angles that would not be evident to one man. There is an advantage, also, in the particular way in which the three men are grouped.

The Local Manager necessarily has his nose pretty close to the grindstone. He is responsible for the operation of the property and should be familiar with all its details. He is closely in touch with all local conditions and with each wave of public sentiment. He is subject to constant pressure from individuals or groups desiring extensions or changes of the property or its service. Frequently these desires will benefit a few to the ultimate disadvantage of the many and should be resisted, but the manager desires to retain the friendship and cooperation of all and his position is difficult. Under these conditions his judgment may sometimes be warped; he may give too much weight to the local side of a question, too little to its other phases. He may be over-influenced by pressure brought to bear on him and choose a line of action that is immediately expedient rather than one that will be of the most permanent and general value. He would be more than human if this were not the case. The District Manager is a little farther removed. He, too, is near the property but at the same time he is in close touch with several other properties and this gives him a wider experience, a broader outlook, and a greater freedom from the effects of temporary local sentiment. He can view the company's problems a little more calmly, a little more judicially, because of his position, because he is not so intimately in touch with all its details. The Division Manager in Boston is still farther removed. He has a still broader experience and outlook and he has the additional advantage of being closely in touch with financial affairs not only of this particular company, but broadly throughout the eastern section of the country, which is its

financial center. The idea of having a District Manager in the district has been gradually developed. For many years this practice was not followed. It results in more prompt action. Questions can be taken up more promptly because there is a man near by. Things come up for conference which formerly did not. In the past it was necessary for a manager to come all the way to Boston every time a conference was necessary, or for some one from Boston to go out to the company. Now that has been reduced to a more reasonable situation. This duty became burdensome; it was a thing which really interfered to some extent with the successful operation of the company's business, so the present scheme has grown gradually and is working wonderfully well.

There is no particular division of duties laid out in the contract between these three men, with one exception. We have found and have always felt that the greatest danger to public utilities was in the development of property. So many properties have suffered and have gone on the rocks through unwise extension and development. There must be extension. We are working for it all the time, and yet that extension must be governed wisely. We must be careful not to extend too far beyond the immediate requirements for service. We may make extensions which will not at the start yield enough to cover the cost of the service but only under rare circumstances are we justified in building an extension which will be a permanent burden on the rest of the business. When an extension is made it must be properly designed and located to provide for future growth and development as well as immediate needs. Otherwise, there will be waste of capital. We must not commit ourselves to any extension until we know where we are going to obtain the necessary capital. Because this subject is so important, there is a provision in the contract that all construction work must first be considered by the Local Manager, the District Manager, and the Division Manager, and that a recommendation must then be made to the Board of Directors of the company and the proposed work authorized by that Board before it can be carried on.

There has grown up a series of departments in the Boston office. I cannot attempt to describe them in detail, but I have had a few statements and figures prepared which perhaps will give you some little idea of some of these departments and what they are doing.

Company Finances and Taxes

The first department on the list is that of the Treasurer. This department is run by Mr. Nichols under the general direction of Mr. Sawyer. Mr. Sawyer is elected Treasurer of each of the companies when so desired. He is then responsible for the finances of those companies, legally as well as from the Organization standpoint, as any Treasurer would be. The Treasurer's Department works to perform the duties of the Treasurer. It is responsible to Mr. Sawyer for the finances and cash of each company and it is its duty to see that the accounting and the cash are properly cared for. It is its duty to borrow the money you may need from banks and to see that you are provided with the cash needed for your working purposes. The cash which goes through its hands per year amounts to about \$60,000,000 which gives a little idea of the volume of the business. The members of the department have to borrow considerable amounts of money for you. Last year they negotiated 566 loans and borrowed \$19,000,000. You have 225 bank accounts, the average combined bank

deposits being about \$4,500,000. The Department keeps a record of every one of those banks, and follows them from month to month so that it may know the conditions of the banks. The minute a bank looks at all shaky, the matter is taken up with you or looked into in some other way, and if there seems to be any chance of financial disaster, the deposit is drawn down or entirely removed from the bank. That in itself has been a source of very material saving. Quite a number of banks have failed in which we have had money deposited, and in all the years we have been working, handling \$60,000,000 a year, the total losses to date amount to less than \$5,000. It has also been the duty of the Treasurer's Department to look after the subject of taxes. That has always involved considerable work, but since the Government has gone into the tax business so broadly, the work has materially expanded. The tax returns at the present time number about 1,400 annually for these companies. In all the tax returns which we have made, there have been claims for additional amounts of less than $1\frac{1}{2}$ per cent of the total, and against those claims we have had counter claims which have more than offset that $1\frac{1}{2}$ per cent. In the case of Federal taxes, there has been the greatest advantage in having them handled through a single channel. The tax laws, as you all know, are tremendously complicated, and it has been necessary to have men here devoting their whole time to nothing but the carrying out of those tax laws. Through their familiarity with them, they have been able to save our companies a very considerable amount of money. Take the one question of depreciation alone. The companies have the right to deduct a certain amount for accrued depreciation. When we took that up with the Department in Washington, the amount which they would have permitted us to deduct was very much smaller than that which they finally approved. It took several trips to Washington to get that through, and it has taken repeated trips to get them to approve our accounts. We have sought always to know the tax laws and to ask for nothing that we could not justify. We have tried to prepare our cases thoroughly and clearly. As a result, the authorities in Washington have granted practically everything for which we have asked. In another way, also the Department has been helpful. We had a question come up on the tax returns in Seattle and a similar question on the tax returns in Houston. In Seattle the decision of the Government meant the largest return to the Government; in Houston the decision also meant the largest return to the Government, but the grounds for the two decisions were exactly reversed. If those companies had been independent and had not known what was going on, each might have paid the full amount, but the question came to us here; we saw the inconsistency, took it up with the Government and secured a satisfactory decision in each case.

Your Treasurer's Department has in its care all of the securities of underlying companies, part of which are held directly and part are pledged under mortgages and held by Trustees. These securities amount to \$167,000,000. The Department prepares statements and estimates of all income and expenditures for our executives here in the Boston office, for the stockholders, and for the Boards of Directors, and that runs into a pretty large volume of continuous work. I asked the Department once to give me something that would indicate the amount of work involved in a minor detail and was told about coupons. You gentlemen all have bonds outstanding on your properties and twice a year the coupons on those bonds were paid and the coupons came into this office. Those

coupons had to be checked up. The Department had to be sure that the coupons were in; it had to know what ones were out; it had to know that it was not receiving counterfeit coupons; so it had to check up those coupons each year, and as they would pile up in considerable volume, having been checked up, they were cremated. That one duty involved 300,000 coupons a year, or about 1,000 a day, which were checked by the Treasurer's Department.

The Protection of Skilled Auditing

The next department is the Auditing Department. You are all familiar with its work. It audits your books. It also audits the accounts of other companies not connected with our Organization. This department has been very efficient, very thorough, and very helpful in all of our work. It is not a department which can be measured in dollars and cents, perhaps, as well as some of the others, yet I will try to do so. This department during the past ten years has audited for our companies transactions approximating \$500,000,000. They have found losses due to dishonesty of about \$25,000. Of that amount, \$15,000 has been paid back by the dishonest persons or their relatives, and the insurance companies have had to pay but \$10,000 during that ten year period on our companies. That is due, of course, to a great many causes. It is due to the character of the men in the Organization, to the training they receive, to the care with which their accounts are followed. This is reflected in our insurance. We are able to secure Fidelity Insurance on any man in our Organization at a rate at least twenty-five per cent better than that allowed an average company. During that same period of ten years, we have made audits of outside companies, and the transactions covered in these audits are very much less in volume than those of our own companies; yet we have found in those companies shortages of \$150,000. We found one shortage that had been accumulating for seventeen years, during which time three audits had been made by other people, who had not discovered it. During the war the Auditing Department got rather shot to pieces. Some of the men went to Hog Island, some went into the Army, and some into other Government work. Altogether we didn't have much of a department left. We were unable to carry on the work which we ordinarily would do and had to turn to outside auditing concerns to do some of our work. When the bills came in from those outside auditors, we found that the man-hours spent on the audit were from two to three times as great as would have been necessary with our own auditors and the work was not as well done. The results were not as satisfactory. Not only were the man-hours greatly increased but the charge per man-hour was also greater, because, of course, they charged a profit on their work. Based on those figures (and they covered the work of three different auditing concerns), it seems clear that the work of our Auditing Department, as compared with having the auditing done by outside concerns, is saving our companies at least \$50,000 a year and possibly \$100,000.

Advantages of Centralized Purchasing

The Purchasing Department you are all familiar with, also, but I want to say just a word about its work. There is sometimes a little question as to what purchasing should be done in Boston and what purchasing should be done out in the field. There is only one rule: the purchase is

to be made where you can purchase cheapest. This should be our sole guide, but in applying the rule we should consider ultimate as well as immediate savings. For example, it may be possible for a company to pick up a small amount of copper wire occasionally in the local market at a lower price than obtainable at the time in Boston and yet considering our copper purchases for a year as a whole we may obtain very much the best results and the greatest saving by bunching the purchases of all companies and obtaining the benefit of quantity buying. In such a case the small saving should be sacrificed for the greater unless both can be secured.

The Purchasing Department in Boston has two advantages over the individual companies: one, the great volume of its business; the other, the fact that it is closely in touch with the market here in Boston and in New York and Chicago, these cities being the headquarters of most of the large industrial concerns and the principal general markets for supplies and materials. The Purchasing Department secures the great advantage of purchasing for all the companies, but it also secures a very much greater advantage from purchasing for our engineering and construction work for outside clients. I doubt if you realize that of the purchases made by the Purchasing Department, only 15 per cent are for companies under our management. Eighty-five per cent are for clients outside our Organization. It is that volume of work that gives the Department one of its great advantages. Here again I have jotted down a few figures just to illustrate how some of those things go. We place, as you know, blanket orders for many classes of supplies: meters, transformers, incandescent lamps, and things of that type. It is estimated that the annual savings on these orders, as compared with placing separate orders for each of the companies, amount to \$200,000 a year. On other purchases the saving runs from 5 per cent to 25 per cent. The saving in some instances comes from merely being in touch with the market. An instance in 1919, when we were notified of a probable rise in the price of copper, shows this. Telegrams were sent out to you men in the companies with the suggestion that orders be sent in immediately to cover your immediate requirements. The orders came in, the rise took place, and we saved on that particular bunch of telegrams about \$35,000. The next year a lot of orders came in for copper and it looked as though the price was going down, so we held the orders up. Some of you kicked, but we held the orders just the same. By holding up those orders for a short time, we saved \$25,000. That is simply a small incidental advantage that one may obtain by being in close touch with the market and having fore-knowledge of price changes.

In 1915 we had a chance to place a fuel contract for our companies on the New England coast. We placed a joint contract for these companies for three years. That contract saved those companies about \$200,000 a year for that period of three years.

In Texas in 1915 the question of purchasing oil for fuel came up and was investigated locally by our local people and by the Purchasing Department and others in the Boston office. After a most careful study, we made up our minds that it was an advantageous time to place a long term contract for oil. Another organization interested in other Texas utilities made a similar investigation at the time and decided that it was not a prudent time to place a long term contract for oil. We placed a five-year contract and that carried us through the war. We were offered \$350,000 to cancel that contract after it had been running two years. It saved us in 1918 alone, as compared with market prices at that time,

\$700,000. The saving in that year to the Eastern Texas Electric Company amounted to 17.6 per cent on its common stock; to the Galveston-Houston Electric Railway Company it amounted to 5.9 per cent; and to the Northern Texas Traction Company it amounted to 8.2 per cent. That contract was a good deal of a life saver during the war.

The question of routing and tracing shipments is another matter in which the Purchasing Department is of material help in securing prompt deliveries, in preventing loss, and in securing some recompense when damage occurs. In 1918, for which I happen to have the figures available, the saving in collected damages from lost or injured shipments alone amounted to about \$20,000. Similar savings are made each year.

Training Future Executives

The Statistics Department, which is the next on the list, furnishes us with figures of all kinds. They take the figures which you send in from the companies and prepare the quarterly comparative statements with which you are familiar, and also many other comparative statements which are useful to us here in our work. This department also serves as a training ground for the young men who go out to the companies. It gives us a department in which we can start the young men, get them in touch with the business and give them a general viewpoint of its character to better advantage than in any other department.

This department has also under its care the records of real estate which we must keep that we may be able to handle releases under mortgages, and other legal transactions. It also has charge of the question of insurance. It does not seem as though insurance would be a very important matter, but it has run into considerable figures. We started the Insurance Department, or the insurance branch of the Statistics Department, fifteen years ago. At that time our average rate was \$1.52 per hundred. At present it is \$0.38 per hundred. To translate that into dollars and cents, if we were handling our present volume of insurance at the average rate of fifteen years ago, it would cost the companies \$500,000 a year more than they are actually paying at present rates. Of course, the amount of insurance has increased very materially during that time, and you may say that this reduction in rate is due to volume of business. That is not so, because the insurance is still carried as it always has been, separately for each company. You men place the insurance locally. You do that for many reasons that are excellent and that make it advisable, but if you ever make up your minds to turn your insurance in to us and have it placed wholesale, we can save from thirty to forty thousand dollars more per year.

Reducing Legal Expense

The Corporation Department acts as secretary for the companies, one of the members of the department being elected secretary of each of the companies when so desired. The department keeps records of all stockholders' and Directors' meetings. It keeps all company records which are to be kept in this office. It looks after all of the legal work of the companies, the preparation of mortgages, the drawing of contracts so far as they have to be drawn here, and all of what you might call the corporate affairs of the company. In doing that work the members of the department have naturally acquired a familiarity with it which enables them to do it better and quicker than we could hope to have it done if it were divided among the

companies. All of that work has to be passed on by your lawyers. It is a rule that the Corporation Department shall never pass on a legal question. The final decision has got to be given by the lawyer. If we took those problems over to the lawyer in the first instance, your legal bills would be very much larger than they are today: but these men in the Corporation Department have been able to get themselves so well posted, so well trained, that they can prepare all the papers and documents, — mortgages, notes, and everything, — take them over to the lawyer, and simply say, "Is this O. K.?" That means that your legal bills are very much reduced, and strange to say, the lawyers like it. They are glad to get that detail work out of their hands, even though it does reduce their bills. The Corporation Department has under its charge the records and documents of something like one hundred corporations.

A Department of Public Relations

The Public Relations Department is a very recent one in name. It has existed as a department for not more than a year, I believe, and yet its work has been carried on in some form from the beginning. The idea of that department is to help on questions such as rates to be charged for light and power, and street car fares; to help on cases that may come up before courts and commissions; to assist in hearings and to help out generally on legislation that affects public utilities and on problems of public relations. Of course we have done that sort of work always, from the start, but recently it has been organized into a definite department under Mr. Nash and has been doing splendid work. You gentlemen realize fully what that means to you. The question of whether you get an increase of 10 per cent in your rates or whether you do not is a question of whether your case is well presented or whether it is not, and you know how much the result may mean to your company in dollars and cents. This department is, and is going to be, one of the most valuable departments in our Organization.

The Filing Department I do not need to comment on. As you all know, it has charge of the filing of all Company papers and documents that are kept in Boston.

The Transfer Department has charge of the transferring of company stock, the payment of dividends and interest, and work of that kind, which would ordinarily be handled through a trust company if the department were not in existence. There is some direct saving in cost to the companies through having our own Transfer Department. There is also a further material advantage in convenience in handling the transfer work and a consequent indirect saving in cost.

The Securities Department I shall not attempt to discuss at all, as Mr. Royce is going to talk about that later. Of course it is a department of vital interest to all our companies. We cannot go ahead unless we have capital, and the Securities Department is the one that supplies us with the sinews of war, — but I will leave that to Mr. Royce to discuss later.

Building up the Personnel

Last we have the Personnel Department, a department whose results cannot be measured in dollars and cents, and yet we all realize that it is the most important department of all. It makes no difference what kind of a system we have; if we haven't got the right kind of men in it, we never

will make a success, and to have the right kind of men, we have to start at the beginning. We must start with the young men as they come into the Organization; we must get the right sort of men and see that they have the right sort of training; we must follow them in their work and see that they have every encouragement and every help, and that they in each case are in the right niche. If they are not in the right niche, we must try again and see if we can find the proper place for them, in that way bringing the best out of every man we have in the Organization. This work was wonderfully handled by Mr. Hovey up to the time of the war, as you all know, but during the war it suffered, partly through Mr. Hovey's illness and partly through conditions brought about by the war. Our young men left us, very properly, to go into the war or into Government work. Other young men were not available, so the work of the department necessarily was sidetracked to some extent. Now we are taking it up again and we want to make it as valuable to the Organization in the future as it has been in the past and of even more value, and that requires not only work here but the utmost cooperation in all departments of the companies. You men outside and we here should try and see that we obtain the very best possible talent; that we put those men in the right positions; that we give them every encouragement in order to bring out the best there is in them; and that we give them always the feeling that we have their personal interest at heart and are going to see that they have an opportunity to go ahead and do the best they can. That is, I think, a vital factor in every department of our work, a factor on which may depend our entire future success.

The Management Annual Charge

Now I am going to skip a little and take up the question of compensation. This contract is divided under four heads. One is called Management, one Consulting Engineering, one Designing and Constructing Engineering, and one Financing. After describing the services to be furnished under each heading the contract takes up the charges made for each department of work. I am going to skip the services of the other departments for the moment and discuss the compensation for the services so far described which come under the heading of Management.

When the Organization first started, it was pretty crude. We did not have a large organization, and the charge was made purely arbitrarily, in a lump sum. The Firm, in effect, said to the company, "We will charge so many hundred or so many thousand dollars a year for such assistance as we may be able to give in the management of your property." The sum was not very definite. It varied with the size of the property and more or less according to what they could afford to pay. If a company was making a poor showing, the charge might be made less for a time with the idea that it would be increased later when the showing improved. That ran along for a little while until we woke up to the fact that the total amount we were receiving did not begin to pay for the expense we were put to in handling the work. Then we changed and tried to put the charge on a basis of cost plus a small salary. That was carried along for a while, but did not prove very satisfactory. The Organization was not very definite at the time. The work of the engineering, construction, and other departments was more or less mixed up with management, and we found it very difficult to get at the exact cost, in a way which would be satisfactory to us and likewise to the companies;

so that method was given up and we decided on a percentage basis. The charge was based on a percentage of gross earnings, which was fixed arbitrarily according to a curve, gradually decreasing as the size of the company increased. For the payment as determined by the curve, we furnished at our expense all management services, and whatever was left over and above the cost of these services, was the compensation of the Organization. That went on for a while and then we discovered that with the growth of our departments and the development of our work, the cost of running the Organization was again greater than the amount we received so we had to make a fourth revision, which is the one in effect at the present time. The annual charge for management, — that is, for the services which I have been describing — is \$3,000 a year plus 2.35 per cent of the company's gross earnings. This is the same for all of the companies with a few exceptions. The idea of the \$3,000 rather than a straight percentage is to increase the net percentage on the small companies. Without this provision the cost of services rendered would exceed the amount received from the small companies. One company, the Puget Sound Company, is on a different basis. This question of charge, by the way, has had to stand a good deal of fire. It has been discussed by the Board of Directors of every one of the companies. It is always put up once a year to the Boards for reconsideration and it is always referred to members of the Boards who are in no way connected with our Organization and have no interest in the contract beyond obtaining as favorable a trade as possible for the utility company they represent. Of course those men are active business men, men of independent judgment, and naturally we have had some different ideas. In the case of the Puget Sound Company, the matter was gone into very exhaustively and the conclusion reached that the Directors would prefer a cost plus salary basis, if we could work it out. We have been able to do this of recent years because the duties and responsibilities of each department of our Organization have gradually become more definite and there is no overlapping of work between the Management and Engineering and Construction divisions. The Puget Sound contract is therefore based on a payment of a considerable part of the expenses at cost, plus a payment of eight-tenths of one per cent of the gross earnings. In one case (the case of the Tampa Company) there were at one time objections to our form of contract because the Tampa Company at that time was making a bad showing. There had been a decided falling off in net earnings and one of the Directors had the idea that we ought not to be paid a percentage of gross earnings but ought to be paid on the net. We said, "All right. We had just as soon be paid on the net as not. You work the thing out and we will try it." His committee worked out a scheme whereby we were paid a certain percentage of the net earnings. We worked on that basis for three and one-half years. The first year and one-half we received less money than we would have been paid under the standard basis of charge but the next two years the new form of charge was more favorable than the old and at the end of the time was decidedly more favorable. We then called the situation to the attention of the Board and said we would be delighted to continue if they wanted us to, but we thought they ought to know how the plan was working out. They promptly changed back to the old basis.

Engineering and Betterment

Now I will turn back to the second heading, which is Consulting Engineering. The Engineering Division furnishes its services in two forms: one, to design and construct for us; the other, to furnish advice and help on current problems of operation and minor technical engineering questions. The contract provides that this division and all of its members shall be at your service at any time to assist you in investigating any kind of engineering problems that you may have and to assist you in working out any details of technical operation or saving in expense. The Engineering Division maintains, as you know, a Betterment Division to assist in power station operation; it makes inspections of machinery, cars, and other apparatus as they go through the shops and factories to be manufactured for your use, and it makes appraisals and other engineering investigations of your property in connection with rate cases and matters of that character. In this class of work we must depend to a very considerable extent on you men in the field to take advantage of the facilities that are offered. To some extent we know what your problems are. We know when you can be helped and we try to help you. To a very considerable extent you know your problems before we do. You know what is up and what you are facing, and it is up to you to see that you get the benefit of all the talent and all the experience that is available here in the Engineering Division. I have a feeling that very much more could be done at times along that line than is.

The work of the Betterment Division, which keeps track of power station operation and assists your local engineers in the handling of their power stations and the output of power, has been very successful. As might be expected, it met with more or less misunderstanding and opposition at the start. Naturally, the men in the power stations were a little doubtful about having people come in to show them how to operate their plants. They thought they knew how themselves; but the net result has been that the companies working under the Betterment Division have operated about 15 per cent better than they did when the power plants were operated under the ordinary power station engineers, and that in itself amounts to a saving which was estimated some time ago at about \$400,000 per year, and it is probably more than that at the present time.

Factory Inspections

In regard to factory and shop inspections, the Engineering Division has in the field a varying number of inspectors, sometimes as few as ten, sometimes as many as fifty, but it has on the average about twenty men out in the field, in the factories and manufacturing plants, following the manufacture of apparatus of one sort and another. Of course, a very considerable part of that work is for companies outside of our management. I shall show you later on that the construction work which the Engineering Division does for companies under our management is only about 12 per cent of their total work. At the same time any one of those men is available at a moment's notice to help you in looking after the proper manufacture of the apparatus which you have ordered, to see that the specifications are lived up to, to see that shipments are promptly made, and to follow up the shipments when they are in transit and see that they are delivered to you promptly and are ready for your use when needed.

The Birney Safety Car

One outcome of that Inspection Department you are all familiar with, and that is the one-man car. Mr. Birney had been for years working to improve our rolling stock. He had labored to cut down the weight of our cars and their cost, and he had accomplished very satisfactory results. We had brought our cars to a lower weight than those of most other companies, but we were not satisfied. We discovered that over in London and in Paris they were operating motor busses, and those motor busses only weighed 350 pounds per seat, while our cars weighed about 700 pounds per seat, and we couldn't see why if they could build a motor bus at 350 pounds a seat, we couldn't build an electric car at 350 pounds a seat. So Mr. Birney came in and we had a powwow here in the Boston office. At first he was very doubtful. He felt that he had been doing everything that possibly could be done, but as always he was a good sport and he said, "I'll go out and I'll try to do it"; so he tackled the problem. He alone could not have solved it. It was the outcome of the combined efforts of Mr. Birney, the men here in Boston, you men in the field, the men in the car barns, the master mechanics; all of whom were drawn in to help solve that problem, and because of our standing in the industry, we were able to secure the support of the leading car builders, the General Electric Company, and the Westinghouse Company. Far be it from me to detract in any way from Mr. Birney's accomplishment; he did a splendid job and is entitled to the highest possible praise, but I am sure he will agree with me that he would hardly have accomplished his object had he tackled it single-handed; it was because our entire Organization was behind him that he was able to draw together all that ability and experience, to draw together all the talent of the country on that problem, and as a result we got our car, with which you are all familiar. It was a fine example of team work and the benefit of a well organized group of companies.

I wonder if you realize what that car means. We have in our own companies 457 of these cars now in operation. We estimate the saving from the use of these cars to be \$1,000,000 per year. But that car was not patented. It was given to the industry as a whole and at first the industry laughed at it. I was over in New York attending a meeting of a committee that was considering jitneys and trying to solve the jitney problem when a representative of the General Electric Company came into the meeting, full of enthusiasm, and said he had the solution of all our problems. He went on to describe the one-man car, which at that time had not been much talked about. He had been working with Mr. Birney and was deeply interested in the car, but he couldn't get a hearing. They ridiculed the idea and said it was wholly impractical, and he finally went out thoroughly discouraged and disgusted with the whole outfit. That was the sort of reception the one-man car first received. At the present time there are 4,300 one-man cars in use, and those cars are saving the industry about \$10,000,000 per year. That is one of the outcomes of our inspection system.

Consulting Engineering at Cost

Now to turn again a minute to the question of cost. These services furnished under Consulting Engineering are charged for at cost. That cost is made up of the actual salaries of the men during the time they

are on the work, plus overhead expenses. These overhead expenses, of course, include rent, light, heat, and office expenses. They also include the unproductive time, as we call it, of the engineers. Of course you realize that a man on engineering work in an organization has quite a bit of his time that cannot be billed out on specific work, time during which he is making studies which will be helpful to him in his future work, time when perhaps he is not busy, when there isn't any work along his line. To cover this unproductive time and meet the full cost of his salary, his productive time must necessarily be billed at a higher rate per hour than his average hourly pay. After making a study based on all the years that we have been in business, and after investigating the same conditions in other engineering companies (and we have looked into it in quite a number of large companies), we find it works out that the cost of the overhead — the general expenses and the unproductive time — just about equals the hourly pay roll cost. Sometimes it runs over that; sometimes when business is active it runs less, but if it is averaged over a considerable period of time, it runs just about equal to the pay roll, so in making out the bills for Consulting Engineering the cost is determined by keeping track of the hours spent on the work and multiplying the number of hours by twice the hourly pay roll cost.

Designing and Constructing Engineering

Now we come to the third division of the Management contract, which is Designing and Constructing Engineering. I am not going into that in detail. Mr. Muhlfeld, I think, is going to talk to you later about the Engineering Division, and he will no doubt cover the matter fully but I do want to bring out two points. One is to try and give you some idea of the extent of the work, not because it is so great, not with any idea of being proud of its size, but simply to give you an idea of the amount of experience there is in that division that is at your service. The Stone & Webster Engineering Corporation was organized in 1906, and since that time it (and its successor, the Division of Construction and Engineering), has designed and constructed work of one kind and another to the extent of \$623,000,000. Of that amount about \$75,000,000 or 12 per cent was for companies under our management. Eighty-eight per cent of it was for outside clients, concerns with which we have no connection whatever. The Engineering Division has installed steam power stations with a total capacity of 710,000 kilowatts. It has installed 550,000 horsepower of water power developments now in operation, with an ultimate capacity in those plants of practically 1,000,000 horsepower. In addition to doing this construction and engineering work, it has been called on to investigate properties operated by others. It has been called on to make appraisals of those properties, and incidental to those appraisals it has had to examine the properties and their conditions, and has seen how they were designed and what sort of results they were giving. That has been very helpful in acquiring knowledge of just what other people are doing. During the period since 1906 it has made examinations of some 600 utility properties, and has appraised those properties to the extent of \$3,500,000,000. That covers a good deal of experience, which is all available for your service to help you out in all of your work.

Another thing about engineering and construction. The question is sometimes brought up, or the suggestion made, that engineering and construction are not a part of management, that they should be separated,

✓ and that managers should do one thing and engineers another. Our set-up has been criticized because we do both. The people who make that criticism should make a more careful study of the public utility business, and I want to point out why. Let us suppose you and I want to start out in some industrial business. We will say we are going to build a cotton mill. Well, we build a mill and we produce cloth. We can go on with that mill for the next hundred years if we choose, without addition and without extension, and go on with it successfully. It may be necessary to take out the machinery and replace it with some more modern type of apparatus, it may be necessary to make other changes, but we can go on and carry it through successfully for an indefinite period, provided we keep our machinery up to date. We don't have to add and we don't have to extend. Suppose we do want to extend. We may add on to that building or we may go to a new location and build a new mill, which presents a new problem different from the other. We can make that extension or build that new mill when and how we please. We can do it when money is available and when conditions are favorable. It all rests at our own option and in our own power. Just compare that a moment with the public utility.

We all know that public utilities grow and grow rapidly. I have some figures showing the growth of the companies under our management for a little over twenty years back, and taking the period from the beginning up to the outbreak of the war, we added on an average each year to our properties an amount equal to about 33 per cent of their total gross earnings. In other words, the amount expended for addition to plant in an average year was equal to 33 per cent of the money that we took in during the year from the companies' operations. It varied slightly, but never was below 20 per cent at any time during that period.

What is true of our companies is true of all others. There is never a time when a public utility can say that its plant is complete. There is never a time when the utility is not making extensions to its lines, its power plants, or some other part of its facilities. Extension and development is the normal condition of its existence and the day that it ceases to extend it ceases to serve the public properly. Moreover the time when any particular extension or development must be made is largely beyond the control of the utility. When the public demands increased service the utility must provide facilities for that service even though capital be scarce and the cost of money, labor and material high. How different all this is from our cotton mill with its completed plant or its further growth at the option of the owner, and how very different are the relations of the cotton mill and the utility to the problems of engineering and construction.

The public utility is a growing organization, like a tree, constantly spreading its roots and branches into new territory and into a broader field of usefulness. That means that design and construction are every day problems, they are as much a part of the every day business of the utility as the operation of its power plant. The very process of design and construction must be to a large extent continuous. To prevent waste of capital and to secure efficient operation the engineer creating today's extension should know the present character of the property and the history of its development and should be as fully posted as possible as to its future requirements. He cannot design merely for the present, he must look constantly into the future and see that today's construction will tie in successfully and economically with that of next year and of the

other years that are to follow. To secure the best results under such conditions engineering and operation must go hand in hand with close and constant cooperation. In no way can this be better accomplished than through a combined engineering and operating organization such as our own.

There is one other thought about the engineering side that it is well to have in mind and that emphasizes its great importance. When a mistake is made in operation it usually may be corrected quite promptly by a change in method or in personnel but this is not true of construction. A mistake in design cannot be lightly thrown aside after it has been embodied in construction. Capital once invested cannot be again reclaimed and though the mistake may result in unsatisfactory and wasteful service it probably will not pay to tear down and replace the faulty construction. The error and its consequences must remain a permanent burden on the property until the addition has lived out its useful life. Here again we see the great importance of close cooperation between the engineer and operator that such mistakes may be avoided.

In describing the work of the Construction and Engineering Division, the management contract gives first a list of the kinds of work that the Construction and Engineering Division will design and construct. In making up that list, the one thought in mind was this. There are certain kinds of work that continue steadily at a fairly uniform rate and that require no great amount of detail design. The ordinary extensions of overhead electric light and power lines is an example of such work. This kind of work can be carried on to best advantage by a local construction and maintenance force, organized and maintained by the utility. Other classes of work are more complicated in design and construction and less regular in volume. For these the utility cannot economically maintain an independent engineering and construction force but must turn to outside sources for help.

This difference in character is the basis for the division of design and construction work between the local forces and the Engineering Division. There is assigned to each the part that it can best perform and in which it can be of greatest service to the utility. In practice it results in a substantially equal division between the two. Of the total additions to plant, about 50 per cent is done through the Engineering Division and about 50 per cent through the local organizations. The contract describes in detail exactly what services are to be rendered and how the cost of the work is to be figured, what services of the Construction and Engineering Division are to be included under the fee that is charged and what services go into the cost of work. In general, all of the services of our Executive Office in Boston and of our District Offices are furnished for the fee and other expenditures are charged into the cost. This is all described in full detail in the contract so that there may be no misunderstanding. The description of the services to be furnished and the method of handling the work corresponds almost exactly with the printed form of engineering and construction contract under which we do a very large volume of work for outside clients. The fee charged varies with the character of the work which is divided into three classes, A, B, and C. These classes are more or less arbitrary divisions, Class A being work which involves a considerable amount of engineering design, such as the installation of a power station; Class B is work that involves less engineering, such as a car barn or transmission system, and Class C is work that is almost

entirely construction, such as the laying of railway track. The fee charged under those three classes is, for the first \$500,000 of work or less, 10 per cent in Class A, 8 per cent in Class B, and $6\frac{1}{2}$ per cent in Class C. Any part of the work over \$500,000 is 7 per cent in Class A, $6\frac{1}{2}$ per cent in Class B, and 5 per cent in Class C. Those rates are based on the rates which we are charging to outside clients and run slightly less than the outside rates. Of course we have a pretty good standard to measure the reasonableness of the charge, for you should keep in mind that 88 per cent of our work along that line is for outside clients and not for our own companies.

Contract May be Terminated at any Time

The contract for our services winds up with this statement — "If at any time you should become dissatisfied with the manner in which we are rendering service or should wish for any reason to discontinue this contract you are at liberty after thirty (30) days' notice in writing to terminate our employment." This provision has occasionally been the subject of comment by people who did not understand the situation. These people have said — "That is a very nice sounding provision, but of course Stone & Webster control these companies and so as a practical matter the contract will never be terminated." That is not true; any such statement is based on a misunderstanding of the facts. This point was raised at one time by certain representatives of the State of Massachusetts. We placed before these representatives the Stockholders' list of each of the companies that was under our management in the State. These lists showed that there was no company in the Massachusetts district in which Stone & Webster owned over 100 shares of stock. Practically the entire stock was owned by people in no way associated with our organization and whose sole interest was to secure the best and most efficient management for their property. We had no more control than the man in the moon except as we were able to hold the confidence of those Stockholders and make them feel that we were doing a good job. You fellows should always have this fact clearly in mind. The holding of your own job as well as ours depends absolutely on your ability and the ability of the organization to produce results for the properties under our care. While Stone & Webster have a larger stock interest in many of the companies outside of Massachusetts the same conditions as to control hold true for practically every company we manage. We are subject to being kicked off the job any day if the Stockholders are dissatisfied. We can retain our position only so long as we serve these Stockholders with loyalty and skill and so maintain their confidence. Whenever we fail in either of these qualities we discredit our own organization and injure its chances of continued success.

Now I have covered the management contract and have tried to point out a few savings that are made by the departments, enough to show that the departments are justifying themselves financially in addition to any other merits that they may have. Of course they are all doing work which must be done somewhere; if it was not done here in the Boston Office, you would have to do a considerable part of it in the local offices of the companies. Some of it would have to be done here in any case, — the financial matters must be handled here since this is where you get your capital. But how about the results as a whole? What have you men really been accomplishing all these years? That is a pretty hard question

to answer. It is pretty hard to get comparative figures between our companies and others, but we have some such figures. We are fortunate in the state of Massachusetts in having very complete figures of all of the Massachusetts public utilities. The Public Utilities Commission has been in existence here for a great many years and keeps very complete records. We made up just before the war some figures to show to the Massachusetts Commission, comparing our companies with others in the state of Massachusetts, and because of the complete records, we were able to make the comparison with practically all similar companies in the State. The results are shown in diagrams, which are across the end of the hall.

Some Very Tangible Results

The first set of diagrams represents the gas companies in the state, and that includes all of the gas companies above a certain size, every one that is at all comparable with ours. We were operating two gas companies in the state of Massachusetts at that time. Our companies are designated by name. On the first sheet [Plate 1] is shown the maximum net rate charged per thousand cubic feet sold, and you will see that our rates are with one exception as low as any on the list. The others, following up the list, run very much higher. This represents conditions before the war.

The next sheet [Plate 2] shows the average income per thousand cubic feet sold. Here we do not show quite as well, because some of the companies had a much larger industrial gas business than ours and this tends to bring down the average rate but still we are well down to the bottom of the sheet and show an average rate well below that of most of the other companies.

On the next sheet [Plate 3] we show total operating expenses less taxes and residuals per thousand cubic feet sold. You will see again that we are down near the bottom of the list.

On the next sheet [Plate 4] we show the expenses for manufacture and purchase of gas less residuals per thousand cubic feet sold, and there again we are well down at the bottom of the scale.

On the next sheet [Plate 5] we show the gas sold per capita, and there you will see we are well up on the scale.

The next sheet [Plate 6] shows the capital stock, premiums, bonds, and notes outstanding on the properties per thousand cubic feet sold, and there again we are down near the bottom. You will see that fully half of the companies at the top have more than twice the capital outstanding on our companies. In Massachusetts we have had Commission regulation for over thirty years, and during that entire period there has been no stock issued at less than par of any kind. All of the bonds or stocks issued in Massachusetts for the last thirty years have been issued for par or for par plus a premium, so the amount of capital stock, premium, bonds, and notes outstanding is an indication of the money that has gone into the properties.

The next set of diagrams shows similar figures for electric light and power companies, and our companies in this case are Abington and Rockland, Brockton, and Lowell. The first sheet [Plate 7] shows the maximum net rate charged per kilowatt hour. Abington and Rockland supplies a very widespread district, very largely residential and to a considerable extent a purely summer community, so it has some disadvantage. Still,

it is fairly well down the scale, while Brockton and Lowell are practically at the end of the list. There are only two lower.

The next sheet [Plate 8] shows the average income per kilowatt hour from the sale of electricity, and here again you will find us pretty well down on the scale.

The third sheet [Plate 9] shows the total operating expenses less taxes and sale of steam expense per kilowatt hour. Here Abington is fairly high. Lowell and Brockton are low, but in the Abington figure there is included the fixed charges on the power plant of the Brockton company because the Abington Company buys its power from Brockton.

On the next sheet [Plate 10] we have the cost of manufacture and purchase of electricity per kilowatt hour sold. There again Abington is high because it has fixed charges in its cost. Lowell and Brockton are well down at the bottom of the list. I want you to notice the upper half of those lists and see how much those companies overrun our costs.

The next sheet [Plate 11] shows the amount of electricity sold in kilowatt hours per capita. Here again we stand well as compared with the other companies. The reason that Company T T shows so abnormal a figure is that the community served by this company suffered through a conflagration. The entire manufacturing district was burned out and so the company was able to do at one fell swoop what we are doing gradually. We are gradually taking on in our companies the power that is being produced in mills and other manufacturing plants. As the mill plants wear out, instead of putting in new plants, most of them are going onto our system. In the territory served by Company T T all those plants were destroyed at one blow, so the company had a chance to go in and develop a plant on the basis of feeding practically all the mills when they were rebuilt, and that is the thing we are heading for. We are going to do that, but we are going to do it gradually where Company T T did it quickly.

The last chart [Plate 12] shows the capital stock, premiums, bonds, and notes outstanding on our properties and on the others. There again we are well down on the list.

Those charts show that we are turning out a large volume of current and a large volume of gas; that we are giving the public a large amount of service per capita; that we are giving it at low rates; that we are operating at low costs; and that our investment costs are very low as compared with other companies.

I would like to show you a similar comparison covering the entire country and our entire group of utilities. I am sure the comparison would be equally favorable. Unfortunately records have not been kept in many other states as in Massachusetts, so the figures are not available. We have, however, secured some information during the war which throws light on this question and which, I am sure, will be interesting to you.

Some Interesting Comparison

During the war the utility industry was, as you know, up against it pretty hard. Realizing the situation a meeting of utility executives was held in New York, which resulted in a committee being sent to Washington to try to secure relief. When this committee conferred with members of Congress and with executives in various government departments they were told that no relief could be hoped for until facts and figures were

prepared and presented showing the exact condition of the industry as a whole and why relief was needed. The committee had no such figures so they returned to New York and attempted to compile them. As a result of their efforts figures were obtained and tabulated from utilities having combined gross earnings of about \$400,000,000, this being about one quarter of the earnings of all utilities in the country. These figures would have been fairly representative of the entire industry but for two facts:

First: The information obtained was principally from large companies and from groups under common management.

Second: There was included a greater percentage of lighting and power companies than street railway companies.

The showing was, therefore, more favorable than would have been the case had all utilities been included. It represented the best quarter of the industry rather than the average. Information was obtained from most of the principal groups of utilities under common management, and we were told that of these groups only one showed an increase in net earnings in the year 1917; that one was the group under your charge, the group that you are managing.

The information covered the years 1914, 1915, 1916 and 1917. It is interesting to compare the combined operating ratios of the large group, which represented the industry as a whole, with the corresponding ratios of the Stone & Webster group for these four years. In 1914 operating expenses of the large group were 62.2 per cent of gross earnings while the Stone & Webster group operated at 56.5 per cent; in 1915 the large group showed 61.3 per cent, the Stone & Webster group 57.4 per cent; in 1916 the large group showed 62.6 per cent, the Stone & Webster group 57.6 per cent; in 1917 the large group showed 68.3 per cent, the Stone & Webster group 58.0 per cent. Our companies had an advantage in operating ratio over the large group of 5.7 per cent in 1914, 3.9 per cent in 1915, 5.0 per cent in 1916, and 10.3 per cent in 1917. In considering these figures, please bear in mind that we have a larger percentage of street railways in our group than any other group in the country, and that this should naturally make our showing less favorable.

Translating these percentages into dollars and cents, if our companies had operated at the same ratio as the large group, the operating expenses of our companies for these four years would have been about \$7,000,000 more than they actually were, an increase of about \$1,750,000 per year. We believe that our companies are now making an even better showing and are saving about \$2,500,000 per year as compared with average operation. If this annual saving were capitalized on an 8 per cent basis, it means that the Stone & Webster companies when operated under your charge are worth \$31,000,000 more than they would be if operated under average management.

Now let us look at net earnings and see how they ran during a part of the war period. Comparing the year ending November 30, 1917, with the year ending November 30, 1916, the net earnings of the larger group DECREASED 5.3 per cent, the Stone & Webster group INCREASED 12 per cent. During the six months ending June 30, 1918, as compared with the corresponding six months of the preceding year, the net earnings of the larger group DECREASED 10.7 per cent, the Stone & Webster group INCREASED 11.7 per cent. In 1904 we were operating utilities with gross earnings of about \$9,500,000 and thought we were doing pretty well with an operating ratio of 65.3 per cent. In 1920, with all of our war

troubles and with all of the difficulties in some of the companies, our combined operation ratio was 63.0 per cent or less than it was in 1904. These figures make a wonderful showing for the war period; a record of which you men may well be proud and for which we offer our sincere congratulations to every member of the Organization. We have had tremendous difficulties to overcome; these I do not need to recount, for you are all familiar with them. We have had to meet an unprecedented situation, a situation which probably never can occur again — we certainly hope so — and yet we have come through with a gain, an improvement which stands out in a most striking way when comparison is made with the rest of the industry.

I want to call your attention next to this diagram [Plate 13] that some of you may have already seen. It compares the results obtained by the steam railroads of the country during the war with the results obtained by the Stone & Webster properties. The horizontal lines on the left of the diagram refer to the earnings of the railroads from the year 1912 to the year 1920, the lines on the right to the earnings of the Stone & Webster companies for the same years. Each line is divided into three parts — the cross-hatched portion shows the percentage of gross earnings required for operating expenses, the solid black the percentage required for taxes, and the open section the percentage of gross earnings remaining for replacement and reserve funds and for distribution to stock and bond holders. Before the railroads were taken over by the Government, operating expenses and taxes consumed about 72 per cent of gross earnings, leaving a balance of about 28 per cent for reserves and distribution to security holders; in 1917 this balance dropped to 26.2 per cent, in 1918 it was 15.5 per cent, in 1919 11.2 per cent, and in 1920 3.4 per cent. Expenses had by this time increased until they consumed almost the entire gross earnings. This was not due to any decrease in gross earnings for these were \$3,597,000,000 in 1916, and had risen to \$6,171,000,000 in 1920. It was due entirely to an increase in operating expense. Wages of employees alone in 1920 were greater than the total gross earnings of 1916. Now look at the Stone & Webster group. Up to 1916 the balance remaining after paying operating expenses and taxes was about 42.5 per cent of the gross earnings; it fell off slightly during the next few years, but was never below 35.4 per cent, and in 1920 the corner was turned and it was back to 37.1 per cent. A more striking example of the waste of Government operation and the savings of efficient private operation would be hard to find.

Our Future Must be Built on Confidence

We have considered the record of the past; now just a word as to the future and then I am through. We have made a wonderful showing, and merely looking at the figures might make us think that everything is rosy, but it isn't. We've got lots of troubles ahead of us still, and you all know that. We're going to have a hard time to hold what we've gained during the war. We're going to find it very difficult to finance these properties during the next few years. It's going to be particularly hard at first; then there will be a gain, but it's going to be a slow gain. We've got to restore the confidence of investors in utility securities; we've got to reach a new security market, a new class of security buyers. With the present tax situation, we cannot hope to sell securities to the large

investor to whom we sold many of them in the past. The large investor cannot afford to buy securities and pay taxes on them under present conditions. He must put his money into non-taxables. We've got to reach out to a much larger group of security holders and security buyers and obtain our money from that source, and as an incident to that we must obtain capital from our local communities. That we are already doing. We believe that is a field which will be very helpful from every point of view. We will not only gain money for our needs, but will have a group of local security holders who will have an interest in the property and should be a tower of strength to help us solve our local problems. We are going to have difficulty in maintaining our rates and the increases in rates that we have secured. We are going to have even more difficulty in getting further increases in rates that we must have in some instances. So the problem before us is no cinch.

On the other hand, I want to call your attention to the fact that Stone & Webster went into the public utility business because it was in a bad way. At the time they went into the business, the investors who had their money in it were thoroughly discouraged; they saw no reasonable outlook for a fair return on their investment or the recovery of their capital. Stone & Webster had the courage of their convictions and stepped into that situation, and through it they made their success. That is what we are facing right this minute, and we have the same opportunity or a greater opportunity than they had at that time. There is no question whatever as to the future if we have the courage and the ability to take advantage of the situation. These companies are going ahead, they are going to grow, and they are going to grow at a rate which will surprise us. I expect that it will be possible twenty years from now to point to figures showing the growth of those twenty years which will make the figures of the last twenty sink into insignificance. These companies will go ahead because of increase in population and because there will be a growth in the use of these facilities surpassing all that we have seen before. This is particularly true in the light and power field. In the early days it was almost entirely a lighting business; power was confined solely to small motors. The generating units in our power stations were little, if any, more efficient than the units that might be put in a large mill. In time we were able to correct this. With the coming of the steam turbine we got a big boost and secured an advantage which put us a long way ahead of the individual mill or factory. We haven't been able to take full advantage of this as yet, but it will come gradually and sooner or later the central station will supply practically the entire power requirements of the community. The gas industry is also going ahead; it has its own field of usefulness; it will not grow as rapidly as electric power, but it will, I believe, have a steady growth in the future as it has had in the past.

The Street Railway is the Real Problem

The street railway is the real problem, a problem concerning which people are sometimes very pessimistic. I want to give you this thought. We always speak of ourselves as being in the street railway business and usually have in mind only the electric railway. When some other form of urban transportation is suggested a shiver runs down our spine and we wonder whether we are to be driven from the field. Let us change our point of view and, in the future, let us always say: We are in the

transportation business. True we are at present operating electric railways, but our business is to furnish transportation. The method may change from time to time, but if it does we are prepared to meet the situation; if any new and more efficient methods are devised we are prepared to adopt them and continue our service to the public.

Personally I believe that we are going to operate electric railways for the next twenty-five years and then for an indefinite period after that. There is nothing in sight, so far as I can see, to take the place of the urban electric railway except in small communities or in outlying districts of larger communities. I think we may to advantage use other forms of transportation to supplement our street railway service, but I think this will be only in territory where travel is light. When the traffic increases, electric railway service will be substituted. In all cases the backbone of our system will continue to be the electric railway. But suppose I am wrong. Suppose, for example, that electricity is to be superseded by some other form of power. Still I believe we will operate on tracks because I believe that is the only way that adequate service can be given in an urban center. We will simply change over our motors or our rolling stock and use the new source of power, whatever this may be. But suppose I am wrong again. Suppose that tracks have outlived their usefulness and are to be abandoned. Still I would say: We are in the transportation business and we should furnish service in whatever way is most efficient, whether it be by motor cars, by trolley busses or by aeroplanes. I say this because I am satisfied that there must always be some systematic and coordinated method of urban transportation. The people must be carried back and forth between their homes, their business and their places of amusement. That is a necessary feature of our modern life that cannot be done away with. It must take place in some form. To have that service satisfactory and economical it must, in my judgment, be conducted by some single organized system. Competition in public service has been shown repeatedly to be extravagant and wasteful. In the early days there was competition between horse car lines and later between electric railways, but this was economically unsound and gradually disappeared. As I told you a few minutes ago, we bought eleven street railways in the city of Seattle and we combined them into a single efficient property. We bought them because eleven street railway properties could not exist in Seattle and properly serve the public. What has been true of horse car lines and of electric railways will be true of any future method of transportation. Good service and efficient operation will compel a unified system.

Then take that other bugaboo, municipal ownership. We have just seen how the Government came out with the steam railroads. You know and I know that municipalities in a democracy can never successfully operate street railways. There may be sporadic attempts, as there are now in Seattle and a few other cities, but this will pass. Sooner or later these properties will return to private operation as did the Philadelphia municipal gas plant. Already the difficulties of these cities are becoming known, and today it would be pretty difficult to sell a street railway to a city. Most cities do not want them at any price.

Our problem then is to keep abreast of the times, to be familiar with every improvement in the art of transportation and to apply these improvements to our properties whenever this will produce better service or more efficient operation.

If we are open-minded and alive to our possibilities, if instead of fearing improvements we are quick to seize and apply them to our own use and the service of the public, we need have no anxiety for the future.

I am sure that we may at this time face the public utility situation with optimism. Notwithstanding all the troubles and all the difficulties that beset us during the war, notwithstanding all the difficulties that we know are ahead of us, the outlook for the industry today is better than when Stone & Webster had the courage to go into it in '93. We have an opportunity to develop and extend these properties in a way that is far beyond anything that could have been imagined at that time. There are unlimited possibilities before us. It is our business to transform those possibilities into fact, and that is what we are going to do.

I thank you.

MASSACHUSETTS GAS COMPANIES		
MAXIMUM NET RATE PER M C F		
IN PRINCIPAL LOCALITIES SERVED		
Company	A	\$ 2.00
1	A	1.80
2	B	1.80
3	C	1.80
4	D	1.75
5	E	1.60
6	F	1.60
7	G	1.60
8	H	1.60
9	I	1.50
10	J	1.50
11	K	1.45
12	L	1.40
13	M	1.40
14	N	1.40
15	O	1.40
16	P	1.40
17	Q	1.30
18	R	1.25
19	S	1.25
20	T	1.25
21	U	1.25
22	V	1.15
23	W	1.10
24	X	1.10
25	Y	1.10
26	Z	1.10
27	AA	1.05
28	BB	1.05
29	CC	1.05
30	DD	1.05
31	EE	1.00
32	FF	1.00
33	GG	1.00
34	HH	1.00
35	II	1.00
36	JJ	1.00
37	KK	.90
38	LL	.90
39	MM	.85
40	NN	.85
41	OO	.85
42	PP	.85
43	QQ	.85
44	RR	.85
45	SS	.80
46	TT	.80
47	UU	.80
48	VV	.80
49	WW	.80
50	XX	.80
51	YY	.80
52	ZZ	.75

Companies under the management
of Stone & Webster, Inc.
shown thus

M 64207-1

PLATE I

MASSACHUSETTS GAS COMPANIES		
AVERAGE INCOME FROM SALE OF GAS		
PER M C F SOLD		
Company	A	\$ 2.00
1	A	1.80
2	B	1.80
3	C	1.80
4	D	1.75
5	E	1.60
6	F	1.60
7	G	1.60
8	H	1.60
9	I	1.50
10	J	1.50
11	K	1.45
12	L	1.40
13	M	1.40
14	N	1.40
15	O	1.40
16	P	1.40
17	Q	1.30
18	R	1.25
19	S	1.25
20	T	1.25
21	U	1.25
22	V	1.15
23	W	1.10
24	X	1.10
25	Y	1.10
26	Z	1.10
27	AA	1.05
28	BB	1.05
29	CC	1.05
30	DD	1.05
31	EE	1.00
32	FF	1.00
33	GG	1.00
34	HH	1.00
35	II	1.00
36	JJ	1.00
37	KK	.90
38	LL	.90
39	MM	.85
40	NN	.85
41	OO	.85
42	PP	.85
43	QQ	.85
44	RR	.85
45	SS	.80
46	TT	.80
47	UU	.80
48	VV	.80
49	WW	.80
50	XX	.80
51	YY	.80
52	ZZ	.75

Companies under the management
of Stone & Webster, Inc.
shown thus

M 64207-2

PLATE 2

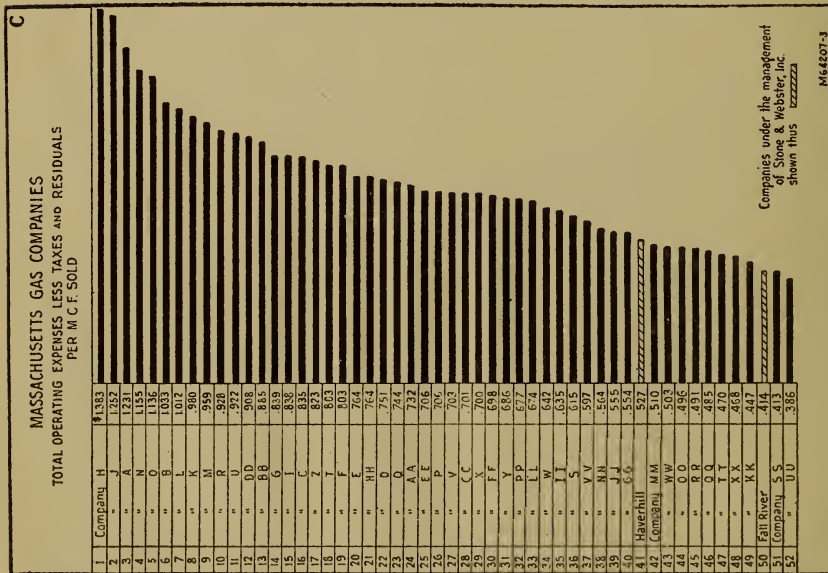


PLATE 3

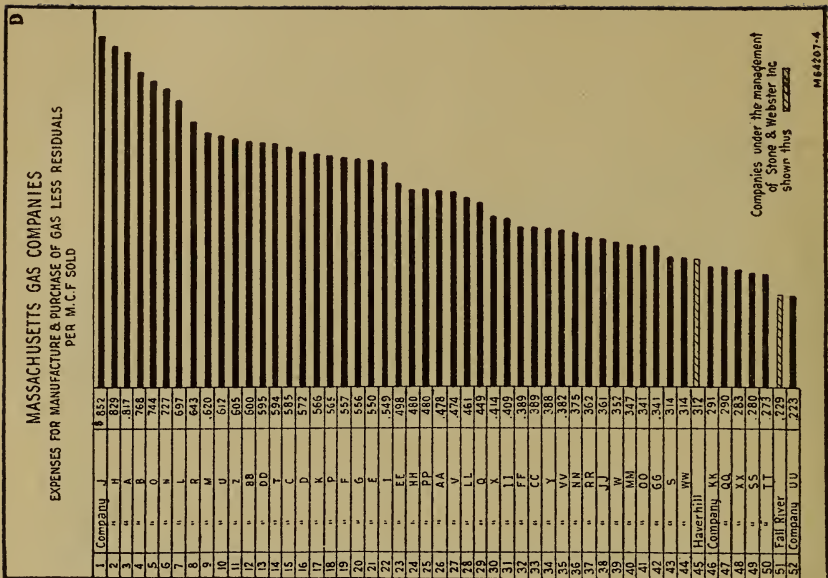


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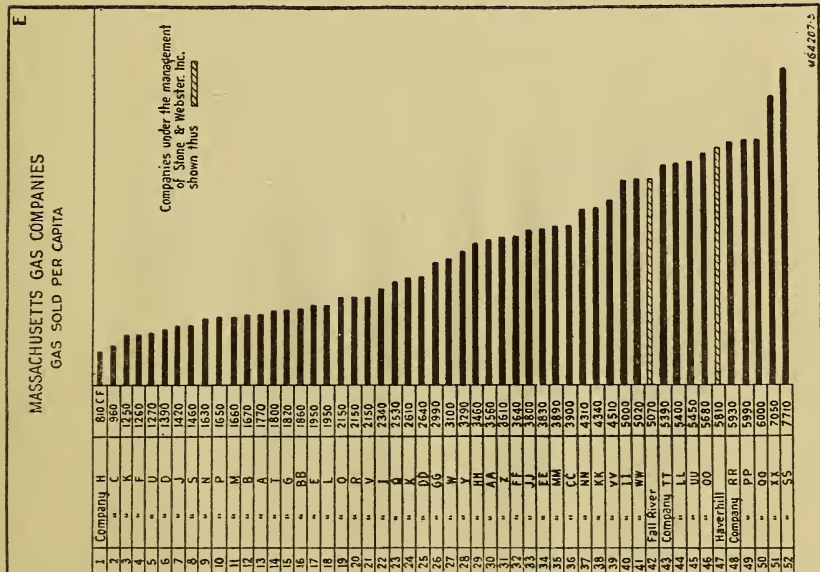


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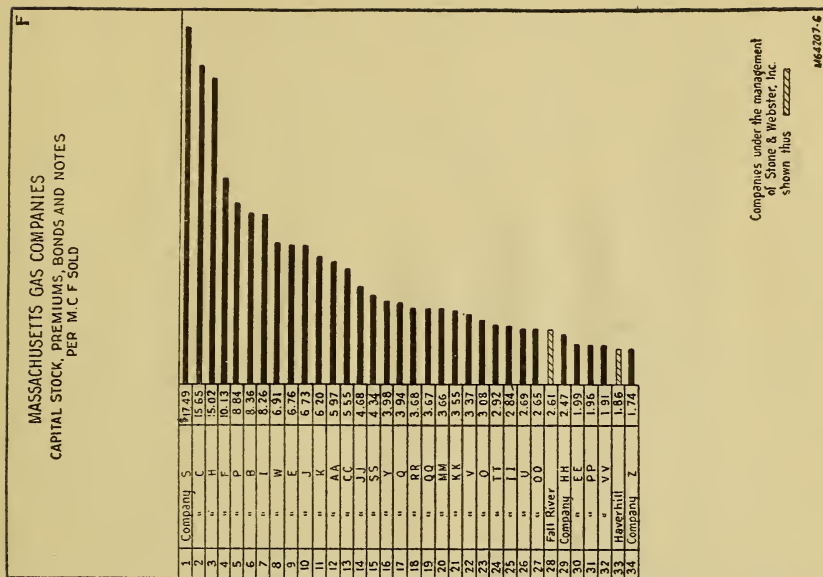


PLATE 6

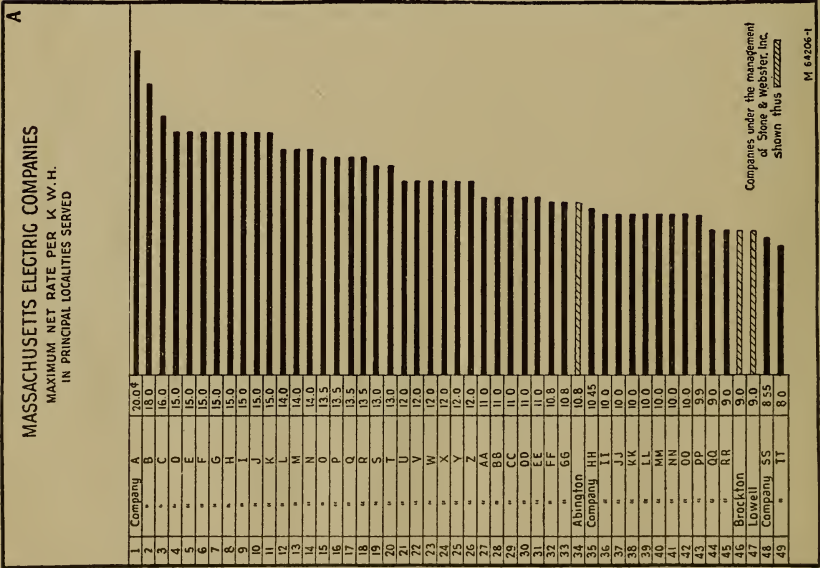


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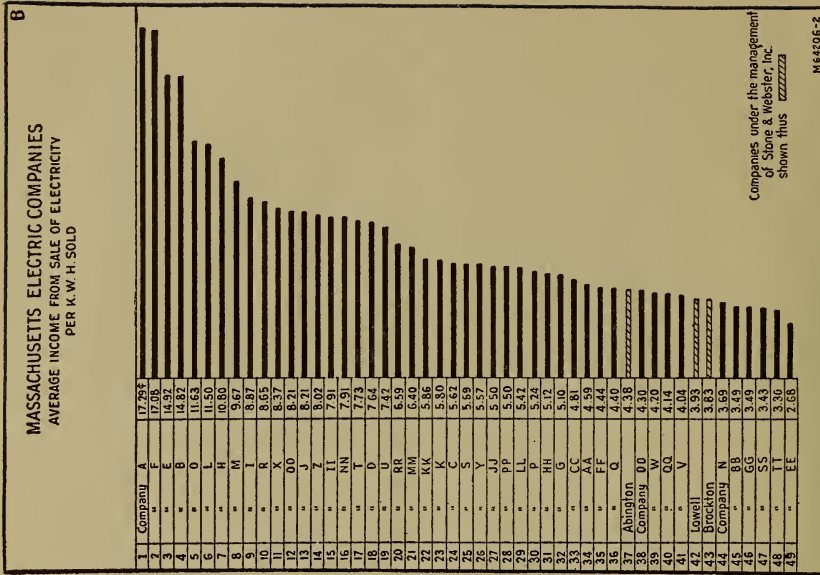


PLATE 8

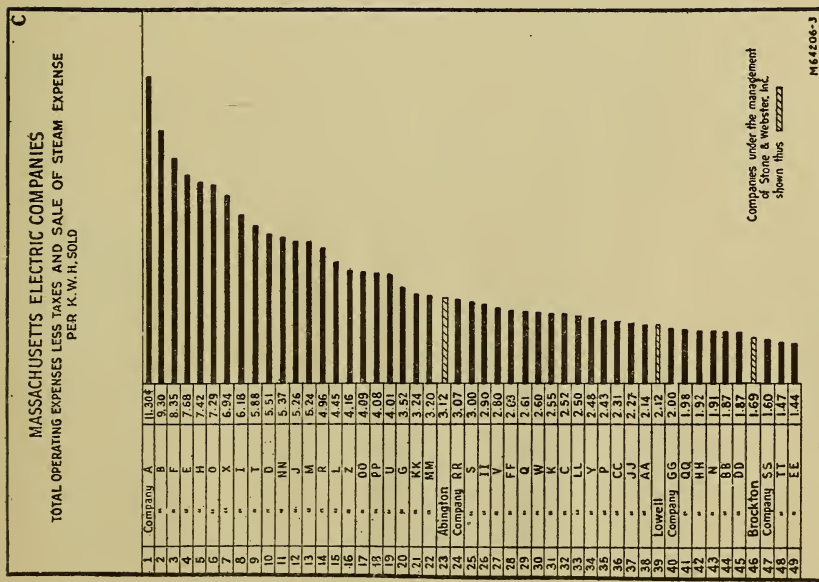


PLATE 9

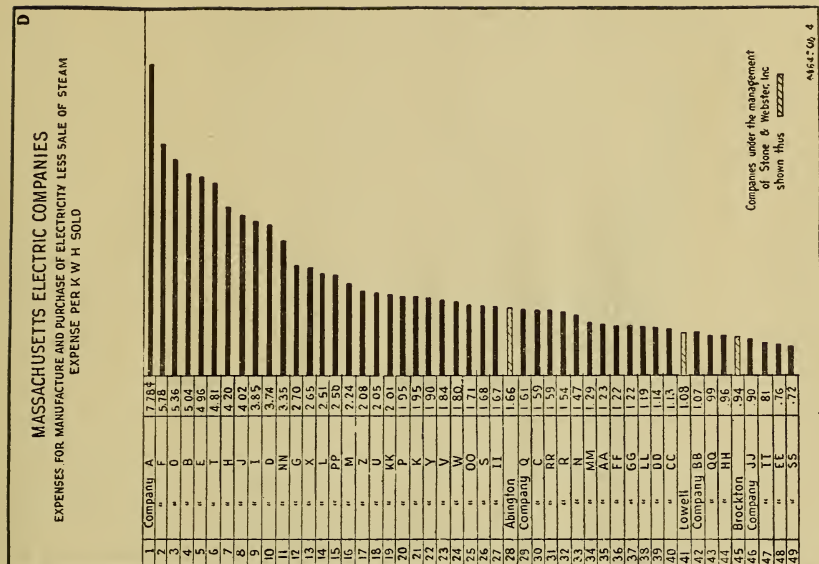


PLATE 10

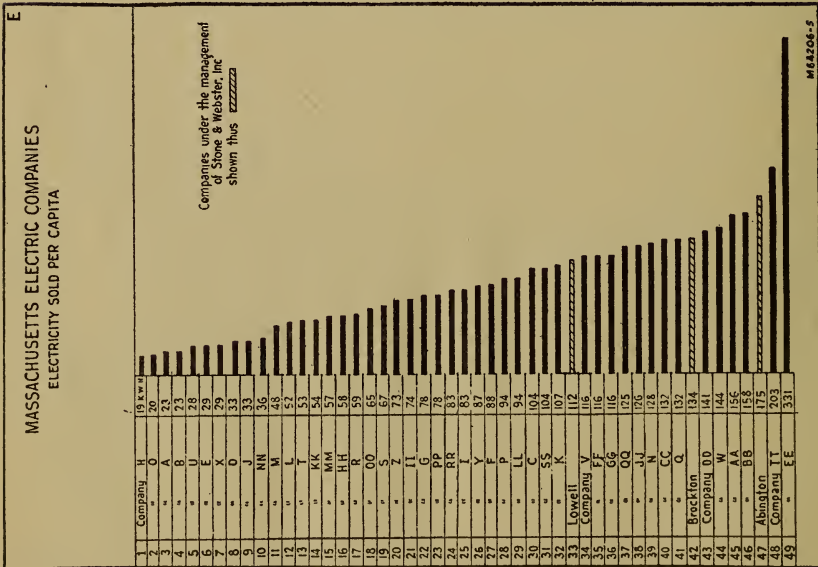


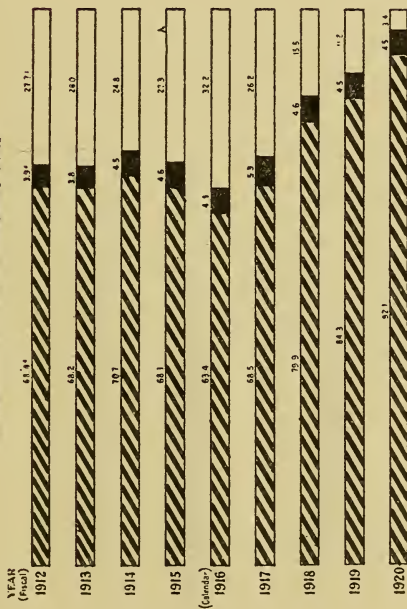
PLATE II



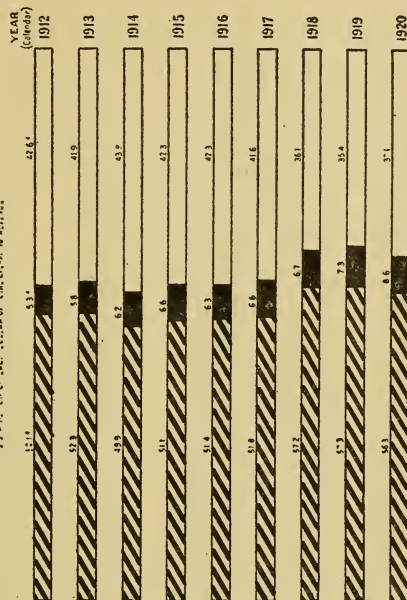
PLATE 12

STEAM ROAD AND PUBLIC UTILITY EARNINGS 1912 - 1920

STEAM RAILROADS - CLASS 1
DISTRIBUTION OF EACH DOLLAR OF RAILWAY OPERATING REVENUE



PUBLIC UTILITIES - STONE & WEBSTER GROUP
2.75% RETURN ON 146% TOTAL CAPITAL OF \$1,000,000,000



LEGEND
 Total Operating Expenses
 Taxes
 Balance for Depreciation and Return on Investment

MISCELLANEOUS DATA

FINANCIAL DATA

PUBLIC UTILITIES UNDER STONE & WEBSTER MANAGEMENT

CAPITALIZATION	1904	1920
Total Face Value.....	\$73,000,000.00	\$219,000,000.00
Debt per Dollar of Gross.....	\$ 3.50	\$ 2.60
Stock per Dollar of Gross.....	\$ 4.50	\$ 2.80
Total per Dollar of Gross.....	\$ 8.00	\$ 5.40

EARNINGS

Gross Earnings.....	\$9,500,000	\$40,500,000
Operating Expenses and Taxes.....	<u>6,200,000*</u>	<u>25,500,000*</u>
Net Earnings.....	3,300,000	15,000,000
Fixed Charges.....	<u>1,600,000</u>	<u>6,500,000</u>
Balance.....	1,700,000	8,500,000
Dividends.....	<u>600,000</u>	<u>3,500,000</u>
Balance for Reserves and Dep.....	<u>1,100,000</u>	<u>5,000,000</u>
* Operating Ratio	65.3%	63%

FINANCING FROM EARNINGS DURING WAR

Balance after Charges 5 Years ending 1920.....	\$35,000,000
Paid out in Dividends.....	15,000,000
Invested in Properties.....	20,000,000

OPERATING DATA

PUBLIC UTILITIES UNDER STONE & WEBSTER MANAGEMENT

GENERAL	1900	1920
Number of Companies.....	10	43
Population Served.....	643,000	3910,000
Earnings per Capita.....	\$4.64	\$ 6.98

POWER

Kilowatt Capacity Stations.....	14,239	443,252
K.W.H. Output.....	35,000,000	1,834,000,000
Tons Coal (other fuel equated).....	58,600	747,300
Lbs. Coal per K.W.H.....	8.76	3.08

RAILWAY

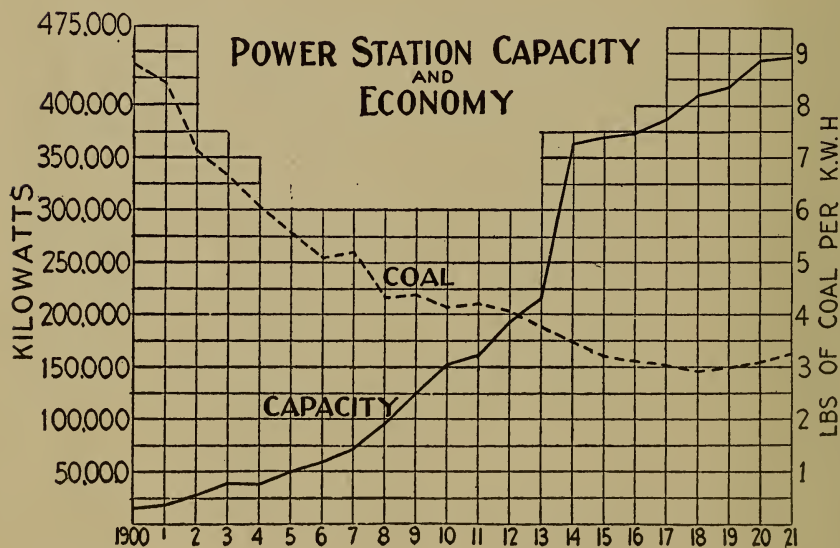
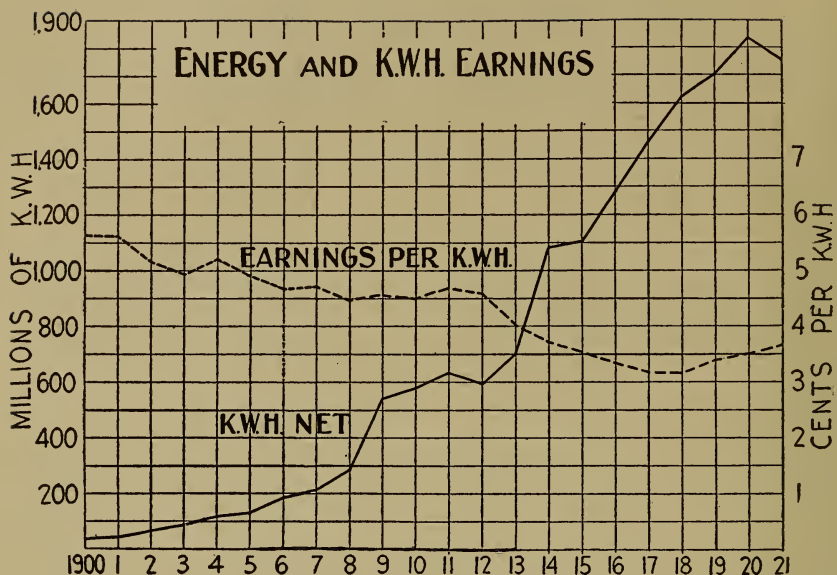
Miles Track.....	133.8	1,032.4
Car Miles.....	5,300,000	49,100,000

LIGHT & POWER

Number Customers.....	8,950	199,100
K.W.H. Output.....	22,700,000	1,797,000,000
K.W. Connected Load.....	15,800	700,000
Gross per K.W.H (cts.).....	5.63	3.49

GAS

Miles of Mains.....	0	819
Number of Meters.....	0	97,000
Thousand Cu. Ft. Made.....	0	2,800,000



Public Utilities under Stone & Webster Management.

STONE & WEBSTER, INC.
ENGINEERING AND CONSTRUCTION

WORK DONE
1900 - 1921

STEAM POWER STATIONS

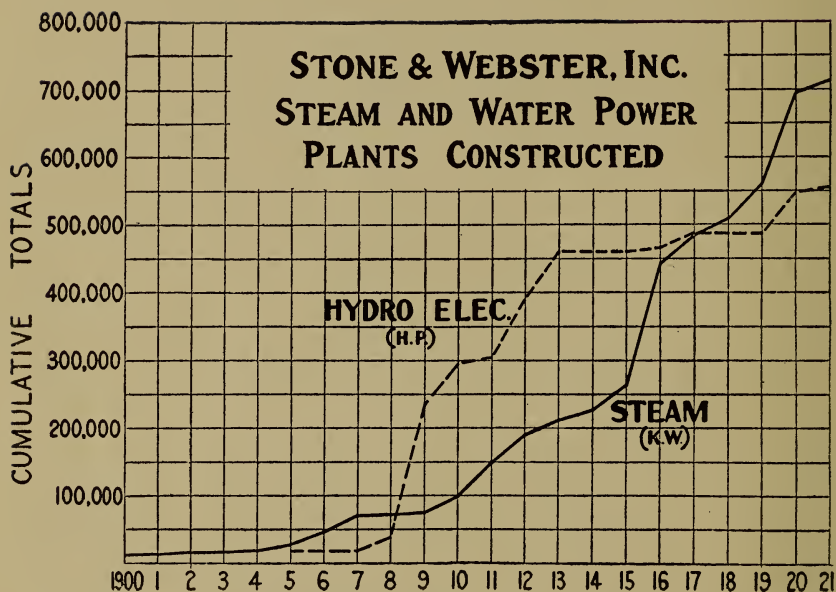
Kilowatts Installed.....	710,000
Steam Turbine Jobs.....	63
Number Turbines Installed.....	86
Number Boiler Installations.....	124
Number Boilers Installed.....	308

HYDRO ELECTRIC DEVELOPMENTS

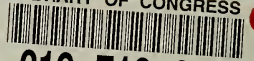
Total Horsepower Installed.....	556,000
Total Horsepower Ultimate Development...	969,000
Number of Developments.....	15

TOTAL COST OF WORK DONE.....\$ 623,000,000

Cost of Work for Companies under
our Management, included in above ... \$ 75,000,000



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